U.S. Department
of Transportation

Federal Aviation Administration

Advisory Circular

Subject: SPECIFICATION FOR L-824 UNDERGROUND ELECTRICAL CABLE FOR AIRPORT LIGHTING CIRCUITS

Date: DRAFT
Initiated by: AAS-100

AC No.: 150/5345-7F
Change:

1. PURPOSE. This advisory circular (AC) comprises the Federal Aviation Administration (FAA) specifications for L-824 underground electrical cable for airport lighting circuits.

2. EFFECTIVE DATE. Effective 6 months after the issue date of this AC, only ~~that~~ cable qualified ~~in accordance~~ with the specifications herein will be listed in AC 150/5345-53, Airport Lighting Equipment Certification Program.

3. CANCELLATION. AC 150/5345-7E, Specification for L-824 Underground Electrical Cable for Airport Lighting Circuits, dated August 2, 2001, is canceled.

4. APPLICATION. The FAA recommends the specifications contained in this AC for the development of airport lighting circuits using L-824 underground electrical cable. The use of these specifications is mandatory for airport projects receiving FAA-administered Federal funds under such programs as the Airport Improvement Program or the Passenger Facility Charge Program.

5. PRINCIPAL CHANGES. The following principal changes have been incorporated:

a. Updated all references to latest revisions.
b. Updated all internet links for obtaining publications.
c. Deleted FAA-STD-013, Quality Control Program Requirements. Replaced with ANSI/ISO 9001, Quality Management Systems – Requirements

~~Note: The old ICEA/National Electrical Manufacturers Association (NEMA) publications were "material based" standards based on cable insulation specifications. The new ICEA/NEMA publications are "application based" standards referencing cable construction and voltage rating.~~

6. METRIC UNITS. To promote an orderly transition to metric units, this specification includes both “English” and “Metric” dimensions. The metric conversions may not be exact equivalents, and until there is an official changeover to the metric system, the English dimensions will govern.

MICHAEL J. O’DONNELL
Director, Office of Airport Safety and Standards

SPECIFICATION FOR L-824 UNDERGROUND ELECTRICAL CABLE FOR AIRPORT LIGHTING CIRCUITS

1. SCOPE AND CLASSIFICATION.

1.1 Scope. This specification covers requirements for underground electrical cable intended for use in airport lighting circuits.

~~**Type A** Deleted (Type A is no longer available).~~

Type B Single and multiple conductor cables rated 600 volts and 5,000 volts having ethylene propylene insulation and an overall jacket.

Type C Single and multiple conductor cables rated 600 and 5,000 volts having cross-linked polyethylene insulation. Multiple conductor cables and shielded cable shall have an overall jacket.

This specification does not apply to wire or cable used to manufacture Class A connectors per ~~in conformance with~~ AC 150/5345-26, FAA Specification for L-823 Plug and Receptacle, Cable Connectors, or for the manufacture of the transformer leads per ~~specified in~~ AC 150/5345-47, Isolation Transformers for Airport Lighting Systems.

2. APPLICABLE DOCUMENTS.

2.1 General. The following documents in effect on the date of request for approval form a part of this specification to the extent specified herein. In the event ~~case~~ of conflict, this specification must ~~shall~~ govern.

2.1.1 ~~Federal Aviation Administration (FAA) Standard.~~
American National Standards Institute/International Organization for Standardization (ANSI/ISO)

~~FAA-STD-013~~	~~Quality Control Program Requirements~~
ISO 9001:2008	Quality Management Systems - Requirements

2.1.2 Insulated Cable Engineers Association, Inc. (ICEA) Publications:

ANSI/ICEA S-95-658 / NEMA WC70 – 2009,	Nonshielded Power Cables Rated 2000 Volts or Less for Use in the Distribution of Electrical Energy
ANSI/ICEA S-96-659 / NEMA WC71 – 1999,	Nonshielded Cables Rated 2001-5000 Volts for Use in the Distribution of Electrical Energy
ICEA S-93-639 / NEMA WC74 – 2000,	5-46 kV Shielded Power Cable for Use in the Distribution of Electrical Energy
ANSI/ICEA T-26-465 / NEMA WC54 – 2008,	Guide for Frequency of Sampling Extruded Dielectric Power, Control, Instrumentation and Portable Cables for Test

~~Copies of FAA ACs may be obtained from the Department of Transportation, General Services Division, M-45, 400 7th Street SW, Washington, DC 20590. Telephone: (202) 267-3161/3115/8329. Some~~ FAA ACs are available on the FAA Airports Web site at http://www.faa.gov/airports/resources/advisory_circulars/

Copies of ~~the above~~ ICEA/NEMA publications may be purchased from ~~Global Engineering Documents, 15 Inverness Way East, Englewood, CO 80112. See the ICEA Web site (**www.icea.net**) for additional information.~~ the International Cable Engineer's Association, Inc. (ICEA) website: www.icea.net/Public_Pages/Documents/NewPowerDocumentsPage.html

3. REQUIREMENTS.

3.1 General. The cable must be suitable for the intended application and must be manufactured consistent with the best commercial practices.

3.1.1 Detail Requirements. The ~~specified~~ cable type must be manufactured per ~~in accordance with~~ the requirements and options (where applicable) ~~specified~~ in Table 1.

3.2 Marking. The cable must be durably marked with the manufacturer's name or trademark, cable trade name or catalog number, conductor size, and voltage rating. The markings must be repeated at regular intervals not exceeding 24 inches (0.6 meters (m)). The markings must not decrease the jacket or insulation thickness to less than the specified value.

4. QUALITY ASSURANCE PROVISIONS.

4.1 Qualification Requirements.

4.1.1 Qualification Request. Procedures for obtaining qualification approval are ~~contained~~ in the latest edition of AC 150/5345-53, Airport Lighting Equipment Certification Program.

4.1.2 Qualification Testing. All cable intended for qualification to this AC must ~~successfully~~ comply with the requirements in section 4.2.

4.1.3 Quality Control Provisions. The manufacturer must provide and maintain a quality control program per ANSI/ISO 9001 (an onsite FAA Quality and Reliability Officer (QRO) is not required) or equivalent Department of Defense quality standards (example: MIL-Q-9858A).
~~The manufacturer shall provide and maintain a quality control program per in accordance with FAA-STD-013 (except that facilities for an FAA Quality Assurance Representative are not required) or suitable alternative, such as ISO 9000 or DOD Quality Standards.~~

4.1.4 Guarantee. The manufacturer must provide the following minimum guarantee for each cable: that the cable has been manufactured and will perform per ~~in accordance with~~ this specification and that any defect in material or workmanship that may occur during proper and normal use during a period of 1 year from the date of installation or a maximum of 2 years from date of shipment will be corrected or replaced by the manufacturer.

4.2 Qualification Testing. Qualification testing must be performed on each insulation type and voltage rating of cable, per ~~as specified in~~ Table 1.

4.3 Production Testing. Production sample tests must be performed at the frequency per ~~established in~~ ICEA T-26-465/ NEMA WC54. Where no frequency is specified, testing frequency must be determined by the product certification organization. At a minimum, production testing must include the High Voltage Spark and Insulation Resistance.

4.4 Production Test Records. At any time after approval has been granted under this specification, a certified copy of factory test reports on the most recent runs of any type of cable meeting this specification shall be made available by the manufacturer upon written request by the FAA. Production testing records must be maintained for a period of 3 years and made available for review by the third-party certifier's quality inspection personnel.

Table 1. Cable Requirements				
CABLE TYPE	**B**		**C**	
VOLTAGE RATING, VOLTS	**600**	**5000**	**600**	**5000**
1. CONDUCTOR				
a. Material: Coated and uncoated copper	x	x	x	x
b. General Requirements:				
ICEA S-95-658, Section 2	x	--	x	--
ICEA S-96-659, Section 2, non-shielded	--	x	--	x
ICEA S-93-639, Section 2, shielded	--	x	--	x
c. Stranding: 7-wire Class B strand or	x	x	x	x
19-wire Class C strand	x	x	x	x
d. Size : AWG	12-4	8-4	12-4	8-4
e. Conductor stress control (conductor shield)				
ICEA S-96-659, Section 3, non-shielded	--	optional	--	optional
ICEA S-93-639, Section 3, shielded	--	x	--	x
2. INSULATION				
a. Material:				
Ethylene Propylene Rubber				
ICEA S-95-658, Class E-1 or E-2	x	--	--	--
ICEA S-96-659, Class E-1 or E-2 or E-4, non-shielded	--	x	--	--
ICEA S-93-639, Class I, II, or IV, shielded	--	x	--	--
Cross-linked Polyethylene				
ICEA S-95-658, Class X-1 or X-2 or X-3	--	--	x	--
ICEA S-96-659, Class X-1 or X-2, non-shielded	--	--	--	x
ICEA S-93-639, Class XLPE, shielded	--	--	--	x
b. Thickness:				
ICEA S-95-658, Table 3-4, column B	x	--	--	--
ICEA S-95-658, Table 3-4, column A (single cond.)	--	--	x	--
ICEA S-95-658, Table 3-4, column B (multi-cond.)	--	--	x	--
ICEA S-96-659, Table 4-2 (single cond.), non-shielded	--	x	--	x
ICEA S-96-659, Table 4-3 (multi-cond.), non-shielded	--	--	--	x
ICEA S-93-639, Table 4-3, shielded	--	x	--	x

CABLE TYPE	B		C	
VOLTAGE RATING, VOLTS	600	5000	600	5000
3. SHIELDING				
Nonmetallic covering and metallic tape:				
ICEA S-93-639, Section 5 & 6	--	optional	--	optional
4. MULTIPLE CONDUCTOR CABLE				
Cable assembly:				
ICEA S-95-658, Section 5	x	--	x	--
ICEA S-96-659, Section 6, non-shielded	--	x	--	x
ICEA S-93-639, Section 8, shielded	--	x	--	x
5. JACKET				
a. Material:				
Heavy-Duty Neoprene				
ICEA S-95-658, Par. 4.1.3	x	--	multi-cond.	--
ICEA S-96-659, Par. 5.1.3, non-shielded	--	x	--	optional
ICEA S-93-639, Par. 7.1.2, shielded	--	x	--	x
Heavy-Duty Chlorosulfonated Polyethylene				
ICEA S-95-658, Par. 4.1.11	x	--	multi-cond.	--
ICEA S-96-659, Par. 5.1.11, nonshielded	--	x	--	optional
ICEA S-93-639, Par. 7.1.10, shielded	--	x	--	x
Polyvinyl Chloride				
ICEA S-95-658, Par. 4.1.5	x	--	multi-cond.	--
ICEA S-96-659, Par. 5.1.5, non-shielded	--	x	--	optional
ICEA S-93-639, Par. 7.1.4, shielded	--	x	--	x
Polyethylene				
ICEA S-95-658, Par. 4.1.6	x	--	multi-cond.	--
ICEA S-96-659, Par. 5.1.6, non-shielded	--	x	--	optional
ICEA S-93-639, Par. 7.1.5, shielded	--	x	--	x
Chlorinated Polyethylene, Thermoplastic				
ICEA S-95-658, Par. 4.1.12	x	--	multi-cond.	--
ICEA S-96-659, Par. 5.1.12, non-shielded	--	x	--	optional
ICEA S-93-639, Par. 7.1.11, shielded	--	x	--	x

CABLE TYPE	B		C	
VOLTAGE RATING, VOLTS	600	5000	600	5000
5. JACKET (continued)				
Chlorinated Polyethylene, Cross-Linked, Heavy Duty				
ICEA S-95-658, Par. 4.1.13	x	--	multi-cond.	--
ICEA S-96-659, Par. 5.1.13, non-shielded	--	x	--	optional
ICEA S-93-639, Par. 7.1.12, shielded	--	x	--	x
b. Thickness				
(1) Single conductor, non-shielded				
ICEA S-95-658, Table 4-2	x	--	--	--
ICEA S-96-659, Table 4-2	--	x	--	optional
(2) Single conductor, shielded				
ICEA S-93-639, Table 7-3	--	x	--	x
(3) Multiple conductor				
ICEA S-95-658, Table 4-4	x	--	x	--
ICEA S-96-659, Table 5-3, non-shielded	--	x	--	x
ICEA S-93-639, Table 7-3, shielded	--	x	--	x
6. COMPONENT TESTS				
Conductor, Conductor stress control layer,				
Insulation, Insulation shield and Jacket:				
ICEA S-95-658, Section 6	x	--	x	--
ICEA S-96-659, Section 7	--	no shield	--	no shield
ICEA S-93-639, Section 9	--	shielded	--	shielded
7. HIGH VOLTAGE TESTS				
Test methods shall be according to—				
ICEA S-95-658, Section 6	x	--	x	--
ICEA S-96-659, Section 7	--	no shield	--	no shield
ICEA S-93-639, Section 9	--	shielded	--	shielded
Test voltages must be per a, b, c, or d				
a. High voltage – ac				
ICEA S-95-658, Table 3-4	x	--	x	--
ICEA S-96-659, Table 4-2	--	no shield	--	no shield
ICEA S-93-639, Table 4-1	--	shielded	--	shielded

CABLE TYPE	B		C	
VOLTAGE RATING, VOLTS	600	5000	600	5000
7. HIGH VOLTAGE TESTS (continued)				
b. High voltage - dc (alternate to ac)				
ICEA S-95-658, Table 3-4	x	--	x	--
ICEA S-96-659, Table 4-2	--	no shield	--	no shield
ICEA S-93-639, Table D-1	--	shielded	--	shielded
c. High voltage spark test - ac				
ICEA S-95-658, Table 3-4	x	--	x	--
d. High voltage spark test - dc (alternate to ac)				
ICEA S-95-658, Table 3-4	x	--	x	--
8. DISCHARGE RESISTANCE TESTS				
Single conductor, non-shielded only				
ICEA S-96-659, Table 4-5, no jacket	--	--	--	x
ICEA S-96-659, Table 5-1, with jacket	--	x	--	x
ICEA S-96-659, E-4 Insulation, Tables 4-5 & 7-1		x		
9. INSULATION RESISTANCE				
ICEA S-95-658, Par. 6.10.2	x	--	x	--
ICEA S-96-659, Par. 7.11.2	--	no shield	--	no shield
ICEA S-93-639, Par. 9.12.3	--	shielded	--	shielded
10. PARTIAL DISCHARGE				
ICEA S-93-639, Par. 9.12.2, shielded	--	x	--	x